

Application No.10/007,281
Response to Office Action

Customer No. 01933

Listing of Claims:

Claims 1-16 (Canceled).

17. (New) An image reading apparatus for optically reading an image, comprising:

lighting means for lighting a predetermined region including an object to be read;

5 image pickup means for receiving reflected light from the predetermined region lit by the lighting means and for outputting a corresponding image pickup signal;

lighting control means for controlling an amount of light emitted by the lighting means in a predetermined range so as to control the image pickup signal output from the image pickup means to a proper level; and

10 determining means for determining a dark image pickup state based on the image pickup signal output from the image pickup means;

15 wherein the lighting control means controls the amount of light emitted by the lighting means to be low when the determining means determines the dark image pickup state; and

wherein the lighting means is configured to repeatedly generate pulsed light in units of image pickup frames, the determining means determines the dark image pickup state in units

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of the image pickup frames, and the lighting control means controls the amount of light emitted by the lighting means in units of the image pickup frames.

18. (New) The apparatus according to claim 17, wherein the lighting control means controls the amount of light emitted by the lighting means to be a lowest amount, within the predetermined range, when the determining means determines the
5 dark image pickup state.

19. (New) The apparatus according to claim 17, wherein, when the lighting control means controls the amount of light emitted by the lighting means to be low when the determining means determines the dark image pickup state, the lighting
5 control means controls the amount of light emitted by the lighting means so as to set the image pickup signal output from the image pickup means at a predetermined level.

20. (New) The apparatus according to claim 17, wherein the lighting control means controls the amount of light emitted by the lighting means within the predetermined range so as to set a maximum value of the image pickup signal output from the image
5 pickup means at a proper level.

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21. (New) The apparatus according to claim 17, wherein the determining means compares a maximum value of the image pickup signal output from the image pickup means to a predetermined threshold, and determines the dark image pickup state when the
5 maximum value is below the predetermined threshold.

22. (New) The apparatus according to claim 21, wherein, when the maximum value is determined by the determining means to be equal to or more than the predetermined threshold, the lighting control means controls the amount of light
5 emitted by the lighting means within the predetermined range to set the image pickup signal output from the image pickup means at a proper level.

23. (New) An image reading apparatus for optically reading an image, comprising:

lighting means for lighting a predetermined region including an object to be read;

5 image pickup means for receiving reflected light from the predetermined region lit by the lighting means and for outputting a corresponding image pickup signal;

lighting control means for controlling an amount of light emitted by the lighting means in a predetermined range so as to

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- 10 control the image pickup signal output from the image pickup
means to a proper level; and
determining means for determining a dark image pickup state
based on the image pickup signal output from the image pickup
means;
- 15 wherein the lighting control means controls the amount of
light emitted by the lighting means to be low when the
determining means determines the dark image pickup state; and
wherein the determining means determines the dark image
pickup state using an image pickup signal corresponding to a
20 substantially central area in an image pickup display among image
pickup signals output from the image pickup means.

24. (New) The apparatus according to claim 23, wherein the
lighting control means controls the amount of light emitted by
the lighting means to be a lowest amount, within the
predetermined range, when the determining means determines the
5 dark image pickup state.

25. (New) The apparatus according to claim 23, wherein,
when the lighting control means controls the amount of light
emitted by the lighting means to be low when the determining
means determines the dark image pickup state, the lighting

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5 control means controls the amount of light emitted by the
lighting means so as to set the image pickup signal output from
the image pickup means at a predetermined level.

26. (New) The apparatus according to claim 23, wherein the
lighting control means controls the amount of light emitted by
the lighting means within the predetermined range so as to set a
maximum value of the image pickup signal output from the image
5 pickup means at a proper level.

27. (New) The apparatus according to claim 23, wherein the
determining means compares a maximum value of the image pickup
signal output from the image pickup means to a predetermined
threshold, and determines the dark image pickup state when the
5 maximum value is below the predetermined threshold.

28. (New) The apparatus according to claim 27, wherein,
when the maximum value is determined by the determining means to
be equal to or more than the predetermined threshold, the
lighting control means controls the amount of light
5 emitted by the lighting means within the predetermined range to
set the image pickup signal output from the image pickup means at
a proper level.

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29. (New) An image reading apparatus for optically reading
an image, comprising;

an LED which lights a predetermined region including an
object to be read;

5 an image pickup element which receives reflected light from
the predetermined region lit by the LED and which outputs a
corresponding image pickup signal;

a dark image pickup detecting circuit which determines a
dark image pickup state based on the image pickup signal output
10 from the image pickup element; and

a control section which controls an amount of light supplied
by the LED within a predetermined range so as to control the
image pickup signal output from the image pickup element to a
proper level, and which controls an amount of light supplied from
15 the LED to be low when the dark image pickup detecting circuit
determines the dark image pickup state;

wherein the LED is driven to repeatedly generate light
pulses in units of image pickup frames, the dark image pickup
detecting circuit determines the dark image pickup state in units
20 of the image pickup frames, and the control section controls the
amount of light supplied from the LED in units of the image
pickup frames.

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30. (New) The apparatus according to claim 29, wherein the control section controls the amount of light emitted by the LED to be a lowest mount in the predetermined range, when the dark image pickup detecting circuit determines the dark image pickup state.

31. (New) The apparatus according to claim 29, wherein, when the control section controls the amount of light emitted by the LED to be low when the dark image pickup detecting circuit determines the dark image pickup state, the control section controls the amount of light emitted by the LED so as to set the image pickup signal output from the image pickup element at a predetermined level.

32. (New) The apparatus according to claim 29, wherein the control section controls the amount of light emitted by the LED within the predetermined range so as to set a maximum value of the image pickup signal output from the image pickup element at a proper level.

33. (New) The apparatus according to claim 29, wherein the dark image pickup detecting circuit compares a maximum value of the image pickup signal output from the image pickup element to a predetermined threshold, and determines the dark image pickup

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5 state when the maximum value is below the predetermined threshold.

34. (New) The apparatus according to claim 33, wherein when the maximum value is determined by the dark image pickup detecting circuit to be equal to or more than the predetermined threshold, the control section controls the amount of light
5 emitted by the LED within the predetermined range so as to set the image pickup signal output from the image pickup element at a proper level.

35. (New) An image reading apparatus for optically reading an image comprising:

an LED which lights a predetermined region including an object to be read;

5 an image pickup element which receives reflected light from the predetermined region lit by the LED and which outputs a corresponding image pickup signal;

a dark image pickup detecting circuit which determines a dark image pickup state based on the image pickup signal output
10 from the image pickup element; and

a control section which controls an amount of light supplied by the LED within a predetermined range so as to control the

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image pickup signal output from the image pickup element to a proper level, and which controls an amount of light supplied from the LED to be low when the dark image pickup detecting circuit determines the dark image pickup state;

wherein the dark image pickup detecting circuit determines a dark image pickup state using an image pickup signal corresponding to a substantial center area in an image pickup display among image pickup signals output from the image pickup element.

36. (New) The apparatus according to claim 35, wherein the control section controls the amount of light emitted by the LED to be a lowest mount in the predetermined range, when the dark image pickup detecting circuit determines the dark image pickup state.

37. (New) The apparatus according to claim 35, wherein, when the control section controls the amount of light emitted by the LED to be low when the dark image pickup detecting circuit determines the dark image pickup state, the control section controls the amount of light emitted by the LED so as to set the image pickup signal output from the image pickup element at a predetermined level.

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38. (New) The apparatus according to claim 35, wherein the control section controls the amount of light emitted by the LED within the predetermined range so as to set a maximum value of the image pickup signal output from the image pickup element at a proper level.

39. (New) The apparatus according to claim 35, wherein the dark image pickup detecting circuit compares a maximum value of the image pickup signal output from the image pickup element to a predetermined threshold, and determines the dark image pickup state when the maximum value is below the predetermined threshold.

40. (New) The apparatus according to claim 39, wherein when the maximum value is determined by the dark image pickup detecting circuit to be equal to or more than the predetermined threshold, the control section controls the amount of light emitted by the LED within the predetermined range so as to set the image pickup signal output from the image pickup element at a proper level.